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**HANGZHOU PUBLIC BICYCLE:  
UNDERSTANDING EARLY ADOPTION AND  
BEHAVIORAL RESPONSE TO BIKESHARING IN  
HANGZHOU, CHINA**

Susan A. Shaheen, Ph.D.

Co-Authors: Hua Zhang, Elliot Martin, and Stacey Guzman

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# Overview

1. Background information:
  - City of Hangzhou
  - Hangzhou Public Bicycle System
2. Methodology
3. Key Findings: demographics, attitudes, travel behavior, perceptions
4. Summary



# City of Hangzhou



- Located on east coast of China; capital of the Zhejiang Province—one of the richest cities in China
- Population of 6.78 million, with 4.24 million in the urban area (eight urban districts)
- Total area of 16,596 square kilometers
- Growth and development has spurred rapid motorization
- To counter auto use, Hangzhou Municipal Government adopted the “Public Transit Priority” in 2004 to encourage seamless and greater public transport use



# Hangzhou Public Bicycle

- Provide free & convenient service for residents and tourists; seamless feeder to public transit
- Launched May 2008; initiated and backed by local gov't and operated by state-owned corporation
- As of July 2010, service operated 50,000 bicycles and 2,000 fixed stations in five core districts
- One hour free service, followed by incremental pricing
- Features smartcards, automated check-in/check-out, and distinguishable bicycles and docking stations
- 90% of total trips free of charge; more than 25% of trips made during peak workday hour
- 88% of users are residents (remainder are tourists)



# Methodology

- Intercept survey conducted in five core districts of Hangzhou with bikesharing
- Conducted from January 14 to March 14, 2010 by three UCB-affiliated researchers who lived in Hangzhou and were familiar with service
- Survey administered on both workdays and weekends at bus stations, bikesharing stations, shopping centers, and busy street corners
- 806 completed surveys, 666 members and 140 non-members



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# Methodology (cont'd)

- **Survey Design and Administration**
  - Two separate questionnaires: bikesharing members and non-members
  - Both questionnaires included same questions on household transport activities, views on several environmental issues, and demographic information
  - Member questionnaire explored reasons for adoption, bikesharing use, and behavioral change
  - Non-member survey queried reasons for not adopting bikesharing



# Sample Demographics

- Average age of members was 31.82, and 28.68 for non-members
  - Suggests members are likely to be under age 45
- Household income for non-members is more dispersed than members
  - 73% of members have a mid-household income between 40,000 (\$5,857) and 100,000 yuan RMB (\$14,641)
  - Non-members exhibited higher proportions of lower and higher incomes
- Occupation of members more diverse than non-members
  - While 81% of non-members are company staff, 62% of members are included in this category. Remaining members are mainly staff of commercial services/government or college students
- Little distinction between members and non-members in terms of gender and education level



# Attitudinal Analysis

- Analysis revealed schism among non-members:
  - Prospective members (n=79)
  - Persistent-non-members (n=61)
- Bikesharing members had most positive attitudes toward Hangzhou's cycling conditions and persistent-non-members most negative
- Environmental attitudes:
  - Although prospective members had not adopted bikesharing, most aware of environmental problems and expressed highest willingness to shift behavior
  - Members have similar but a little less positive attitude. Persistent-non-members exhibited much lower awareness and willingness to change behavior



# Attitudinal Analysis

Attitudinal Statements Percent Strongly Agree and Agree		Member (n=666)	Non-Member	
			Prospective Member (n=79)	Persistent-Non-Member (n=61)
Hangzhou Cycling Conditions	The weather is suitable for cycling*	93%	85%	51%
	Cycling is safe in Hangzhou†*	83%	70%	44%
	The price of public transit is expensive*	68%	62%	39%
	Public transit is often crowded	88%	77%	69%
	Waiting time for public transit is often long	64%	84%	72%
Environmental Issues	Motor vehicle usage is an important reason for environmental problems†*	93%	97%	77%
	I'd be willing to ride a bicycle or take transit to help improve air quality†*	91%	96%	77%
	Global warming is currently happening†*	90%	100%	66%
	Global warming is caused by human activity*	92%	96%	69%

†Members and Prospective-Members different to a degree that is statistically significant at 95% level (Mann-Whitney)  
 \*Prospective-Members and Persistent-Non-Members different to a degree that is statistically significant at 95% level (Mann-Whitney)



# Travel Behavior

- Bikesharing Use — Bikesharing Members
  - 70% of bikesharing members used the service in their commute *at least occasionally*
  - 30% *regularly* used it as part of commute
  - Members also use bikesharing for non-work trips related to shopping, entertainment, and other errands
  - 40% stated the station they used most was closest to work, and another 40% reported home station
  - Remaining 20% divided among proximity to school, bus stations, attractions, and scenic locations
  - Members and prospective members had higher average vehicle ownership. *This suggests that auto ownership is not associated with lower bikesharing adoption.*



# Travel Behavior (cont'd)

- Bike Use — Non-Members
  - Less frequent bike use overall
  - 20% of persistent-non-members used their personal bike to commute
  - 30% of prospective members used bikes to commute
  - Ownership of traditional or electric bicycles was not statistically significant between members and non-members: members (0.55 bikes/hhd) and non-members (0.49 bikes/hhd)



# Travel Behavior (cont'd)

- Bikesharing is shifting user travel:
  - Majority of members use bikesharing for trips they previously walked or took bus transit
  - 30% are substituting taxi trips with bikesharing
  - 78% of car-owner respondents (n=144) stated that they used bikesharing for trips previously taken by auto
  - Roughly 50% of car households used bikesharing to substitute bus transit
  - In carless households (n=522), more than 80% used bikesharing to substitute bus transit
  - 60% of carless households substituted walking, and 20% substituted taxi trips with bikesharing



# Bikesharing Perceptions

- For bikesharing members:
  - 80% very satisfied with system due to its low cost, smartcards, station abundance, and minimal problems
  - 12% thought operating hours were convenient
  - Complaints included limited parking space and bike availability (weekends) and inconvenient hours of operation
  - Members indicated that real-time bike/parking availability information, more bikesharing stations, and better bike maintenance would improve the service



# Summary

- Bikesharing capturing modal share from bus transit, walking, autos, and taxis
- Minority felt bikesharing caused them to use public transit more often and postpone auto purchase
- Modal shifts suggest that bikesharing acts as both a *competitor* and a *complement* to existing public transit system
- Bikesharing appears to be reducing automotive travel, especially for bikesharing households that own cars
- Recommendations include providing real-time bike/parking availability information, more bikesharing stations and hours of operation, and better bike maintenance



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